

REMARKS

Favorable reconsideration of this application is requested in view of the following remarks.

Claims 1-12 are pending in this application, with Claims 1, 9 and 10 being independent.

In part 2 of the Official Action an issue is raised regarding the Abstract. The Abstract is amended, thereby addressing that issue.

Claims 1-12 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,449,060 to Kawai et al., hereinafter *Kawai*.

The present application relates to image processing and techniques for decreasing deterioration of processed images. Paragraph [0004] of the present application describes that in image forming various processes such as smoothing and edge enhancement are generally employed to improve image quality. However, image processing is performed on pixels of image data in accordance with an image type, e.g., character image data or halftone-dot image data. Specifically, a pixel that is judged to be in a halftone-dot area is typically subjected to smoothing and a pixel that is judged to be in an edge area of a character is typically subjected to edge enhancement. Paragraph [0008] of the present application describes that conventional image processing is problematic in that a pixel in an image of a character may not be recognized correctly and may be misjudged to be a pixel in a halftone-dot area. When a pixel is misjudged to be in a halftone-dot area, smoothing is performed on that pixel. When the pixel is part of a small character, it becomes impossible to expect output of a small character that can be recognized. See for example, the character in Figure 2 of the present application.

To address those issues, the present application discusses a solution that relates to a first judgment whether a target pixel is an isolated pixel for a halftone-dot area, correction of the result of the first judgment, and a second judgment based on the corrected results of the first judgment. Figure 9 of the present application illustrates a block diagram corresponding to that subject matter showing a brightness chroma detection unit 441, a halftone preprocessing unit 442, an isolated pixel detection unit 443, a filter processing unit 444, a halftone-dot area judgment unit 445, and a halftone-dot area expansion unit 446. Paragraph [0062] of the present application describes that the isolated pixel detection unit 443 judges whether a target pixel corresponds to an isolated pixel or not, based on comparison results of brightness data of a target pixel and brightness data of nearby pixels. For example, Figure 5 of the present application shows a target pixel V33 whose brightness is compared with the brightness of the surrounding pixels. When a threshold level of difference is reached it is determined to be an isolated pixel.

Next, a filter processing unit 444 corrects the results of the isolated pixel detection unit. Figure 10 and paragraph [0065] of the present application describe that the filter processing unit uses a series of filters to perform a second correction. Figure 9 in the present application shows examples of 11 patterns for filters. In each filter, the pixel of interest is positioned in the upper left hand corner of the 3*3 pixels. When the isolated pixel signal for 3*3 including the present correction target pixel at the upper left corner matches one of the 11 patterns, the filter processing unit 444 sets the isolated pixel signal at "high" and outputs the isolated pixel signal as "high." When the isolated pixel signal for the 3*3 pixels including the present correction target pixel at the upper left hand corner does not match any of the 11 patterns, the

filter processing unit 444 corrects the isolated pixel signal for the present correction target pixel, if having been set at "high," to be "low." A detailed description of that process is presented in paragraph [0066] of the present application.

Claim 1 defines an image processing apparatus comprising:

- 1) an acquisition unit for acquiring image data that includes a plurality of pixels;
- 2) a first-judgment unit for setting each of the plurality of pixels as a first target pixel and performing a first-judgment as to whether the first target pixel is an isolated pixel for a judgment of a halftone-dot area;
- 3) a first-judgment result correction unit for correcting results of the first-judgment, to determine isolated pixels to be used in a second-judgment; and
- 4) a second-judgment unit for setting each of the plurality of pixels as a second target pixel and performing the second-judgment as to whether the second target pixel is in a halftone-dot area, by referring to the corrected results of the first-judgment.

The image processing method and apparatus disclosed in *Kawai* is quite different than the present application in that *Kawai* does not disclose a first-judgment correction unit and only discloses one judgment unit.

Figure 1 in *Kawai* is a block diagram mainly showing the arrangement of an image processing unit 209 (column 7, lines 18-19). A color image input unit 101 comprises an image reader unit. Figure 1 also shows a luminance/density conversion unit 106, a color correction unit 107, a binarization unit 108, a smoothing/resolution conversion unit 109, a color image output unit 111, and a spatial filter coefficient storage unit 112. During operation, a signal G1 of the three

color-separated signals is input to the character/halftone image determination unit 111. The character/halftone determination unit 111 determines if a pixel of interest corresponds to a line image such as character or a thin line, or corresponds to a continuation-gradation image (halftone image). Basically, the character/halftone image determination unit determines if the pixel of interest is in a character image or a halftone image. The character/halftone determination unit 111 then sends a determination signal TI to the spatial filter coefficient storage unit 112. The determination signal indicates that the pixel of interest is either part of a character image or a halftone image. The spatial filter coefficient storage unit 112 selects spatial filter coefficients 1302, as shown in Figure 13 of *Kawai*, based on the determination signal. See column 1, lines 23-35 of *Kawai*.

More specifically, the spatial filter storage unit 112 stores character spatial filter coefficients and halftone image spatial filter coefficients. When the pixel of interest corresponds to a character signal, the storage unit 112 selects the character spatial filter coefficients and when the pixel of interest corresponds to a halftone image signal, it selects the halftone image spatial filter coefficients. The spatial filter storage unit 112 merely stores coefficients and selects them based on the type of determination signal TI, *i.e.*, character or halftone.

In sum, *Kawai*: 1) determines if the image data is character image data or halftone image data, 2) selects a stored spatial filter coefficients based on that determination, and 3) uses the selected spatial filter coefficients to correct the entire image data.

Claim 1 is allowable at least because *Kawai* does not disclose or suggest a first-judgment result correction unit for correcting results of a first judgment. That is,

Kawai discloses that the character/halftone determination unit 111 performs a judgment operation, and that based on that judgment operation, the spatial filter storage unit 112 selects character spatial filter coefficients. The Official Action proposes that the storage unit 112 corresponds to a first-judgment correction unit for correcting results of a first-judgment, but that is not correct at least because the storage unit merely outputs a saved spatial filter based on the TI and does not make any correction to a first-judgment made by the character/halftone determination unit 111.

Should the rejection of Claim 1 be maintained, it is requested that is be specifically explained where or how *Kawai* discloses an operation of the storage unit 112 that could be considered to be a correction of the judgment of the character/halftone image determination unit 111, as defined in the claims.

Claim 1 is also allowable at least because it defines a first and a second judgment unit. The Official Action relies on the edge emphasis extraction unit 113 for a disclosure of a second judgment unit, however, that characterization is not accurate. That is, the edge emphasis extraction unit 113 does not function as a judgment unit that sets each of a plurality of pixels as a second target pixel and perform a judgment as to whether the second target pixel is in a halftone-dot area, by referring to corrected results of a first-judgment. Rather, the edge emphasis extraction unit 113 is concerned with just that, edge extraction, which is not the same as the above noted judgment as defined by Claim 1. In fact, column 8, 49-52 states that "[t]he edge emphasis amount extraction unit 113 extracts an edge emphasis amount ϵ using the character or halftone image spatial filter coefficients K_{ij} selected by the character/halftone image determination signal TI."

Should the rejection of Claim 1 be maintained, it is requested that it be explained how extraction of an edge emphasis amount discloses the claimed subject matter relating to a second-judgment unit for setting each of the plurality of pixels as a second target pixel and performing a second-judgment as to whether the second target pixel is in a halftone-dot area, by referring to the corrected results of the first-judgment. As it stands, that alleged correlation is not understood.

For at least those reasons stated above, Claim 1 is allowable.

Claims 9 and 10 are allowable for similar reasons as those set forth above with regard to Claim 1.

Claims 2-8, 11 and 12 are allowable at least by virtue of their dependence upon allowable independent Claim 1.

For at least the above-reasons, it is requested that all the rejections be withdrawn and that this application be allowed in a timely manner.

In the event that there are any questions concerning this amendment, or the application in general, the Examiner is respectfully urged to telephone the undersigned attorney so that prosecution of the application may be expedited.

Respectfully submitted,

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